

Mitchell's Mill Bridge

(Carrs Mill Bridge)

Spanning Winter's Run on Carrs Mill Road,
approximately 2 miles west of Bel Air

Bel Air Vicinity

Harford County

Maryland

HAER No. MD-79

HAER
MD
13-BEL AIR
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN BUILDINGS SURVEY
MID-ATLANTIC REGION, NATIONAL PARK SERVICE
DEPARTMENT OF THE INTERIOR
PHILADELPHIA, PENNSYLVANIA 19106

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HISTORIC AMERICAN ENGINEERING RECORD

MITCHELL'S MILL BRIDGE (Carrs Mill Bridge) HAER No. MD-79

Location: Spanning Winter's Run on Carrs Mill Road approximately two miles west of Bel Air, Bel Air vicinity, Harford County, Maryland

UTM: 18.379640.4376820
Quad: Jarrettsville, Maryland

Date of Construction: 1885. Encasement of abutments in concrete, c. 1920-50; minor repairs and modifications, c. 1950-60.

Present Owner: Harford County Department of Public Works
220 South Main Street
Bel Air, Maryland 21014-3865

Present Use: Vehicular bridge

Significance: The Mitchell's Mill Bridge is a surviving example of the late 19th century wrought iron bridges once found throughout rural Maryland. The Pratt pony truss employed in the Mitchell's Mill span was widely used in the design of single-span bridges erected between 1870 and 1935. Due to increasing development in the rural areas of Maryland and the accompanying replacement of older highway bridges, relatively few of the 19th century Pratt truss bridges remain in northern Maryland.

Project Information: This documentation was undertaken in May and June of 1990 by the Harford County Department of Public Works as a mitigative measure prior to the relocation of the Mitchell's Mill Bridge. The mitigation is in accordance with

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a Memorandum of Agreement signed by the Federal Highway Administration, Maryland State Historic Preservation Officer, and the Advisory Council on Historic Preservation. The Agreement is in compliance with Section 106 of the National Historic Preservation Act of 1966. The existing bridge, which is being replaced with a new span, will be relocated to Harford Glen Park.

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Date: June 15, 1990

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Mitchell's Mill Bridge is located in the west-central portion of Harford County, Maryland and spans Winter's Run, one of the principal streams in western Harford County. The run flows to the southeast and empties into the Bush River at the southern end of the county. In the vicinity of the bridge (Figure 1), Winter's Run first flows south, then turns northeast and passes below the bridge. The stream then flows east/northeast, before turning southeast toward the Bush River. The original natural setting along the run on either side of the Mitchell's Mill Bridge is largely intact, and there is no residential or commercial development within view of the span. Carrs Mill Road approaches the bridge from the east-northeast along the north bank of Winter's Run. After turning south and crossing the bridge, the road continues a short distance along the south bank of the run, and then departs to the south.

The 1885 Mitchell's Mill Bridge is a single-span, pin-connected, Pratt pony truss bridge constructed of wrought iron. The overall dimensions of the four-panel bridge are 51 feet by 15 feet; the panels are 5.6 feet deep (Figure 2). There are two pony, or low trusses forming the sides of the bridge. Each truss is composed of a top chord, posts, lower chords, and diagonal reinforcement eye bars. At the ends of the top chords are half-hip end posts, which are anchored in the abutments. The top chords consist of double, 5- to 6-inch I-beams riveted together with cast iron plates. The three posts in each truss are composed of two channels laced together with diagonal cast iron strips.

The pin connection in the design refers to the use of double eye bars as lower chords. The "eyed" heads of the lower chord bars hang from bolts at the bottoms of each post. Similar double eye bars run diagonally across each panel in the truss and hang on bolts at the tops and bottoms of the posts. Across the two central panels in each truss, a single diagonal eye bar runs the opposite direction from the double bars. There are turnbuckles on the original diagonal eye bars.

The single-lane bridge deck is constructed of 3-inch by 6-inch wooden planks, which are laid across wrought iron, I-beam stringers (longitudinal beams) anchored in the two abutments. The stringers rest on three transverse floor beams. The floor beams are suspended with U-bolts from the lower ends of the posts. All stringers and floor beams are 12 inches wide.

The abutments on the north and south banks are constructed of granite random rubble, probably quarried in the vicinity. Sometime between 1920 and 1950, the abutments were partially encased in poured concrete, perhaps to halt the deterioration of the mortar. The original masonry is exposed on the west side of the south abutment. Some of the joints have recently been filled with Portland cement.

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Several alterations have been made to the bridge structure in the 20th century. The principal change has been the encasement of the abutments in concrete. The encasement has imbedded the anchoring bearings for the truss in rigid positions, preventing the bearings from moving in their shoes, as designed. Since World War II, diagonal steel rods have been installed between the floor beams, for additional reinforcement. The rods are bolted to plates attached to the floor beams. Probably also since the war, several of the single diagonal eye bars on the east truss have weakened or broken, and the bars have been repaired by welding new steel bars to the original bars to form splices. Beneath the bridge, several steel diagonal bars have been broken and been repaired using similar splices. It is possible that several stringers and floor beams have been replaced since the bridge was constructed.

During the 19th and early 20th centuries, Winter's Run was known as the primary power source for grist and saw mills in western Harford County. One of these mills, the Rockdale Mill, was established in the early 1800s on Winter's Run near the communities of Vale and Watervale. The mill stood on the property to the north of the existing Mitchell's Mill Bridge and produced high quality corn meal and buckwheat flour.¹

The road now known as Carrs Mill Road, which passes over the Mitchell's Mill Bridge, was a long-established market route from Fallston to Bel Air, the county seat. Several wooden bridges were constructed along the stream to accommodate the traffic of millers and patrons. The Rockdale Mill was originally reached from the south via a wooden bridge at the approximate location of the Mitchell's Mill Bridge. During the 1860s, the Rockdale Mill and the property to the north were purchased by Isaac Mitchell. By the 1880s, Mitchell's sons, Samuel and Howard, had taken over the milling operations. The bridge near the mill served as a vital link between Mitchell's Mill and the communities of Vale, Fallston, and Bel Air.²

¹Ralph Norman and C. Milton Wright, "Old Mills of Harford County" Harford County Directory (Baltimore: State Directories Publishing Company, 1953), pp. 214-215; and C. Milton Wright, Our Harford Heritage. A History of Harford County, Maryland (Glen Burnie MD: French-Bray Printing Company, 1967), pp. 180-181.

²Telephone conversation with Mrs. Lucille (Carr) Myers and personal conversation with Mrs. Mabel Andrews, 31 May 1990; Deed from Joseph R. Wetherill to Isaac Mitchell, 12 September 1867, Liber No. 19, folio 148, and Deed from Noble L. Mitchell to Clement G. Butler, 2 December 1889, Liber No. 65, folio 484. Land Records Office, Harford County Courthouse, Bel Air, Maryland; 1880 United States Census, Harford County, Maryland, Fallston Precinct, pp. 6-7. Census 11, Microfilm Copy No. T9, Roll No. 511; and The Bel Air Aegis and Intelligencer, 14 August 1885, p. 2.

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On August 3, 1885 a flood damaged or destroyed nearly every wooden bridge over Winter's Run. At a meeting of the Harford County Commissioners on August 4, 1885, each commissioner was requested to assess the storm damage to roads and bridges in his district and relate the information to the county at a special meeting three days later. The Harford County Commissioners listed the bridge at "Mitchell's Mill over Winter's Run" among the six most important bridges to be replaced.³

The commissioners immediately contracted with the Wrought Iron Bridge Company of Canton, Ohio to replace the wrecked spans with wrought iron, Pratt pony truss bridges. Because prompt replacement of the bridges was imperative, the County Commissioners did not advertise for bids, but assigned the contract directly to The Wrought Iron Bridge Company. The actual engineer/designer of the bridge is unknown. The company and its agent, L. W. Finley, were already known to the commissioners from their bids on several previous and recent bridge construction projects.⁴

The estimated cost of repairing all of the bridges destroyed by the flood was \$15,000. This sum was considered burdensome by the County Commissioners. Rather than raise taxes to pay for the bridge reconstructions, the commissioners decided to distribute the sum over a number of years by issuing county bonds that would mature at specified intervals.⁵ Although the bonds were not the most convenient or economical means of financing the bridges, the commissioners believed that bonds would be more acceptable to county taxpayers.

Construction for the Mitchell's Mill Bridge commenced by August 14, 1885. The County Commissioners stipulated that the new bridge be raised one to two feet above the previous one, and although the abutments had been damaged in the flood, the original masonry was to be reconditioned. L. W. Finley assured the commissioners that all of the bridges that he was

³The Aegis, 7 August 1885; County Commissioners, Harford County, Proceedings of the County Commissioners, August 4, 1885. Microfiche Cat. No. 7110210-165. Microforms Room, Harford County Administration Building, Bel Air, Maryland. Although it is not possible to date exactly when each appellation was used, in historical records the bridge is simply referred to as "the bridge over Winter's Run at Mitchell's Mill." For HAER documentation purposes, the bridge is called "Mitchell's Mill Bridge." Most recently, the local community has used the name "Carrs Mill Bridge," after Jesse Carr, the last person to own the mill nearest to the bridge. Carr owned and operated the mill from 1906 to 1938.

⁴The Aegis, 14 August 1885; and Proceedings, August 4, 1885 and January to December 1883.

⁵The Aegis, 24 August 1885.

contracted to rebuild would be fully erected within forty-five days after work was begun. The Canton firm manufactured the replacement bridges for Harford County elsewhere and transported them to the construction sites. A September, 1885 announcement in The Bel Air Aegis and Intelligencer reported that all of the bridges, including the Mitchell's Mill Bridge, were shipped to Harford County at the same time.⁶ By the end of October, the wrought iron Mitchell's Mill Bridge was complete. The cost of the contract was \$662.50.⁷

There is no record of the contractor who built or re-built the masonry bridge abutments. It is known that Finley's firm did not provide the abutments for the 1885 bridges in Harford County. Other masonry contracts for abutment work during the same time period were awarded to George A. Nagle by the County Commissioners. It is therefore possible that Nagle also served as the principal masonry contractor for the Mitchell's Mill Bridge.

The design that was chosen by the Wrought Iron Bridge Company for the Mitchell's Mill Bridge had become a favorite bridge type by the 1880s. Patented by Thomas W. and Caleb Pratt in 1844, the Pratt truss was an advance over previous simple-span, low truss designs with respect to "simplicity, rigidity, adaptability to construction details and economy."⁸ Although based on the earlier Howe and Warren truss designs, the Pratt truss differed in its structural configuration (Figure 4). The design was the reverse of the Howe truss. In the Pratt truss, the posts (vertical members) between the top and bottom chords were under compression, rather than in tension, as they were in the Howe. Further, the Pratt counters (diagonal members) were in tension, while in the Howe design, they were under compression.⁹

Locally, the Pratt bridge truss had achieved considerable popularity by the 1880s. Proposals for wrought iron Pratt truss bridges were frequently discussed in the pages of The Bel Air Aegis, and the County Commissioners repeatedly specified the use of the iron Pratt truss for new bridges.¹⁰

⁶The Aegis, 18 September 1885, p. 2.

⁷Ibid, 14 August 1885, p. 2 and 23 October 1885, p. 2.

⁸Llewellyn Nathaniel Edwards, A Record of History and Evolution of Early American Bridges (Orono ME: University Press, 1959), p. 74.

⁹Milo S. Ketchum, The Design of Highway Bridges (New York: McGraw-Hill Book Company, 1912), pp. 2, 6, and 7.

¹⁰The Aegis, 28 August 1885; and Proceedings, 1898-1907.

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Perhaps with the Pratt truss in mind, the commissioners advertised the following specifications for several simple-span bridges:

Roadway in each bridge, 14 feet wide in the clear; truss to have three panels, with two iron floor beams. Roadway joists to be 6 lines of 6 inch I beams. Floor to be 3 inch white oak, of good quality. Capacity of bridge to be 100 lbs. to the square foot of floor surface, exclusive of its own weight. Straining iron 12,500 in tension, and 10,000 in compression, by Gordon's Formula. Bidders to furnish full specifications and strain sheet. These bridges are to be first-class in every respect.¹¹

The Wrought Iron Bridge Company probably adapted a standard Pratt pony truss design for the bridge over Winter's Run. Such a possibility is suggested by the similarity of the Mitchell's Mill Bridge design to standard span designs described and illustrated in engineering textbooks and journals of the period. For example, as late as 1912, a text on highway bridge design discussed and illustrated (Figure 5) a pin-connected, Pratt truss bridge with details very close to those used in the Mitchell's Mill span:

Pin-connected low truss highway bridges are commonly built of the Pratt type, with either half-hip or full slope end-posts. The upper chords of pin-connected low truss highway bridges are made of two channels and a top cover plate, or of two channels laced; the posts are usually made of four angles laced or battened; while the tension members are made of rods or eye-bars. . . . the floorbeams [are] riveted below the lower chords . . .¹²

The Mitchell's Mill Bridge is one of a dwindling number of pre-1900 wrought-iron bridges surviving in Harford County. It is also one of the last Pratt pony truss spans remaining from the 1885 bridge reconstruction campaign, which transformed the crossings over Winter Run. The bridge symbolizes at a local level the revolution in civil engineering that occurred in the United States after the Civil War. Wooden structures were discarded in favor of wrought iron structural systems with the potential for greater stability, permanence, and fire resistance.

¹¹The Aegis, 18 September 1885.

¹²Ketchum, Design, pp. 208, 210.

SOURCES OF INFORMATION

Original engineering drawings:

No original engineering drawings were found in the files of the Department of Public Works or elsewhere in the records of the Harford County Government. Neither were any drawings found for the modifications made to the bridge in the 20th century.

Historic views:

No historical photographs or other historic views depicting the bridge were found in the files of the Harford County Department of Public Works, the Harford County Public Library, or the Harford County Historical Society Library, all in Bel Air, Maryland.

Interviews:

Andrews, Mrs. Mabel. Personal conversation with. 31 May 1990.

Beshore, Parker. Telephone conversation with. 31 May 1990.

Myers, Mrs. Lucille (Carr). Telephone conversation with. 31 May 1990.

Primary and unpublished sources:

Deed books, Land Record Office, Harford County Courthouse, Bel Air, Maryland.

1880 United States Census, Harford County, Maryland. (Fallston Precinct).

County Commissioners, Harford County. Proceedings of the County Commissioners. County Commissioners Minutes 1877-1885. Harford County Office of Administration, Microforms Room. Bel Air, Maryland.

Secondary and published sources:

The Bel Air Aegis and Intelligencer, August, September, October 1885.

Comp, T. Allan, and Jackson, Donald. "Bridge Truss Types: A Guide to Dating and Identifying." [Technical Leaflet 95] History News 32 (May 1977).

Condit, Carl W. American Building Art. New York: Oxford University Press, 1961.

Edwards, Llewellyn Nathaniel. A Record of History and Evolution of Early American Bridges. Orono ME: University Press, 1959.

Gies, Joseph. Bridges and Men. Garden City NY: Doubleday & Company, Inc., 1963.

Harford County Directory. Baltimore: State Directories Publishing Company, 1953.

Ketchum, Milo S. The Design of Highway Bridges. New York: McGraw-Hill Book Company, 1912.

Maryland Geological Survey. Report On the Highways of Maryland. Baltimore: Johns Hopkins Press, 1899.

Merriman, Thaddeus and Wiggin, Thomas H., ed. American Civil Engineers' Handbook. New York: John Wiley & Sons, Inc., 1930.

Plowden, David. Bridges: The Spans of North America. New York: The Viking Press, 1974.

Wright, C. Milton. Our Harford Heritage. A History of Harford County, Maryland. Glen Burnie MD: French-Bray Printing Company, 1967.

Likely sources not yet investigated:

Contemporary information from the 1880s may be available at the Library of Congress regarding the Pratt truss bridge designs in use during the decade. Engineering journals or pattern books from the era would be particularly helpful. Research at the Library of Congress may also yield additional information regarding the relative importance in the bridge construction field of the Wrought Iron Bridge Company of Canton, Ohio.

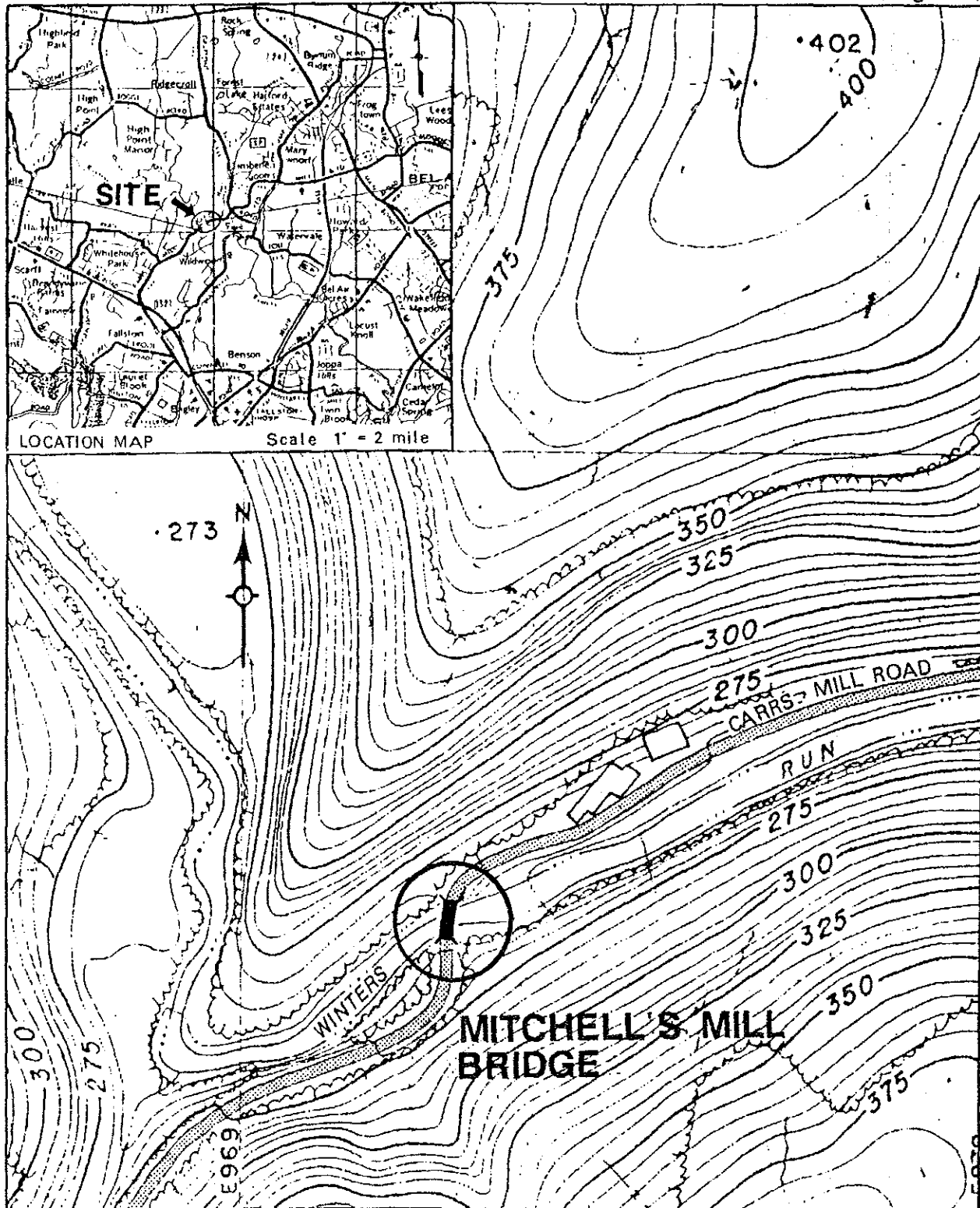


FIGURE 1. Sketch site plan of Mitchell's Mill Bridge.
 Scale: 1" = 200'.

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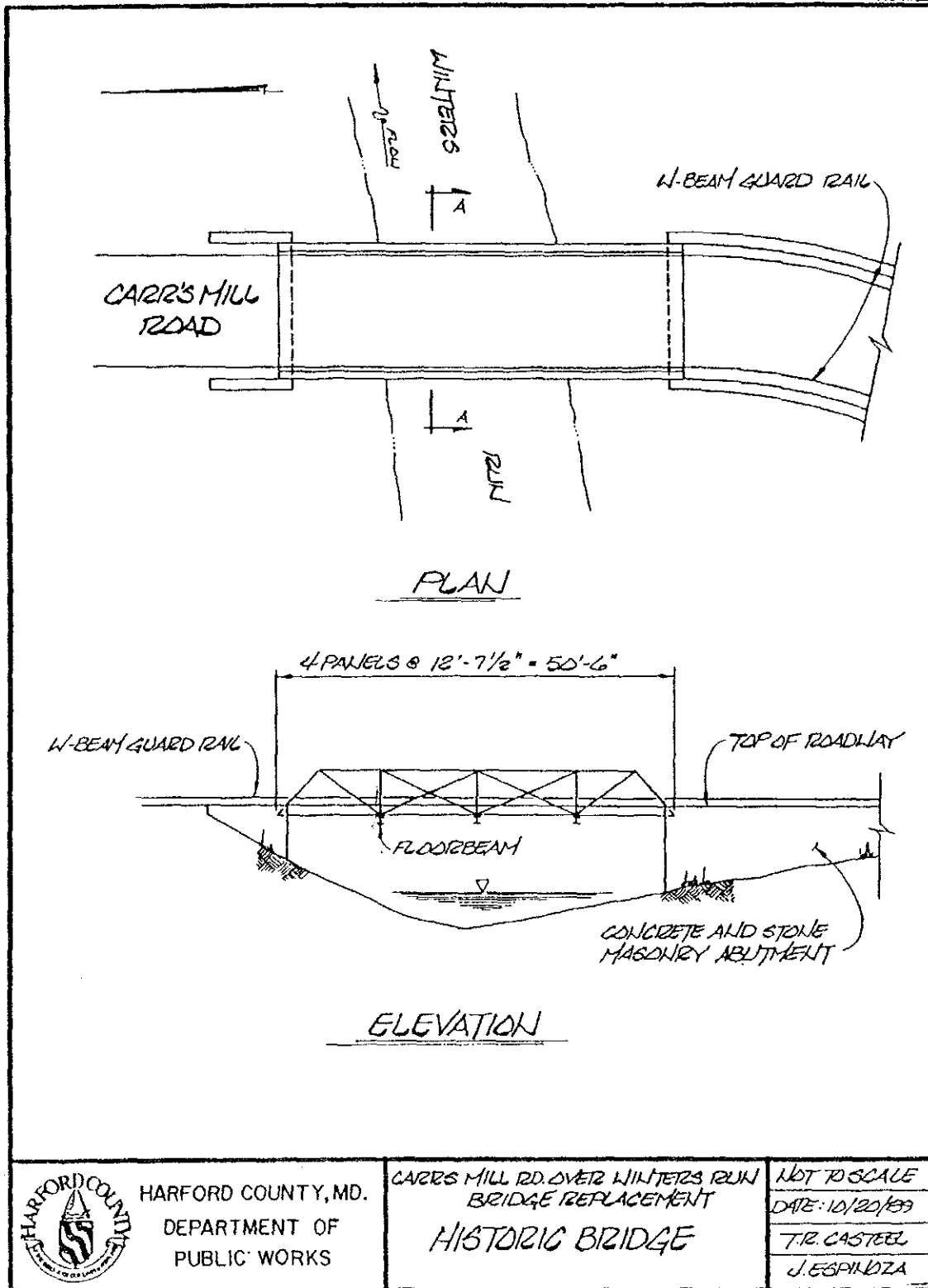


FIGURE 2. Plan and elevation of Mitchell's Mill Bridge.

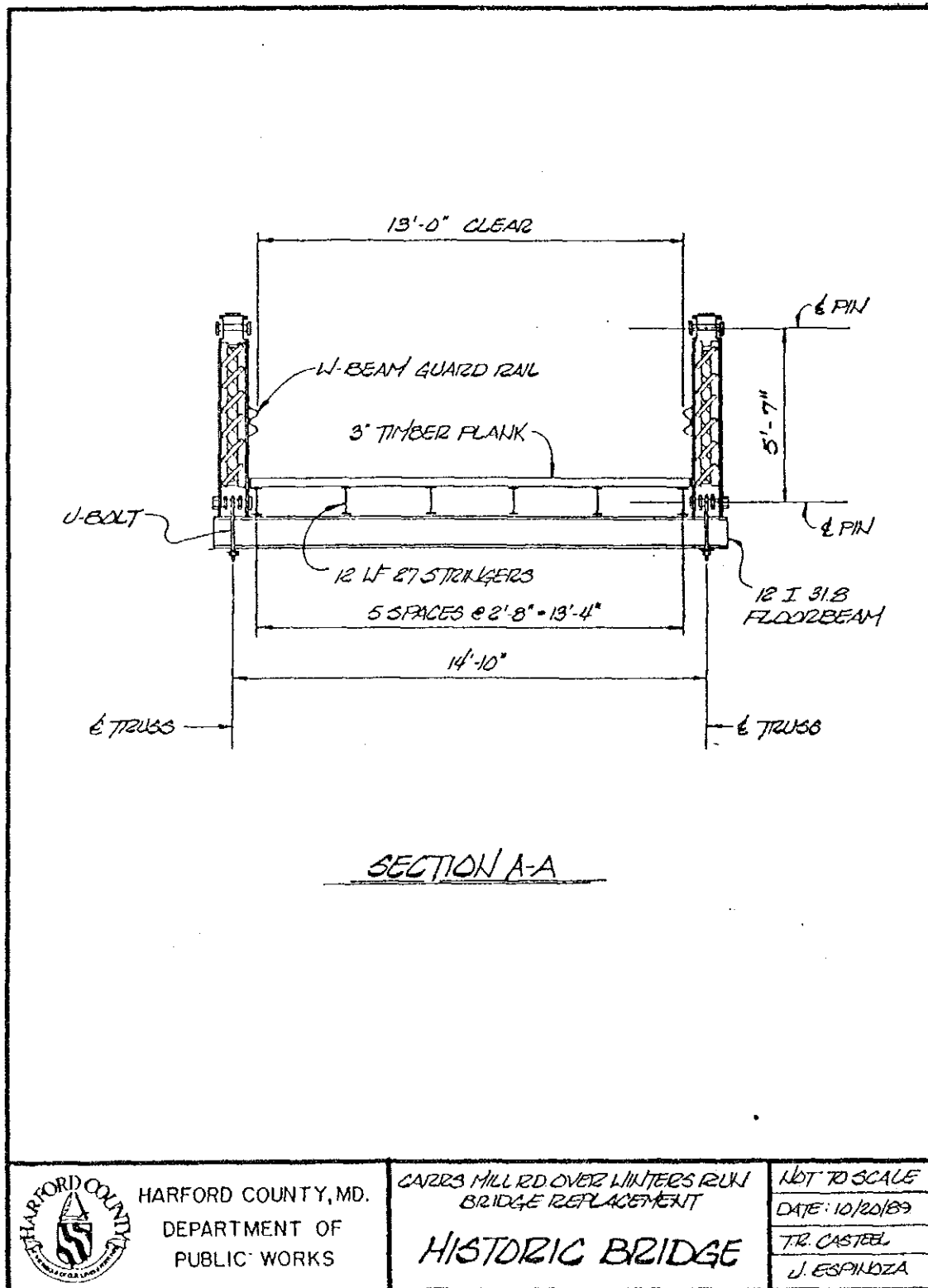


FIGURE 3. Section through the bridge.

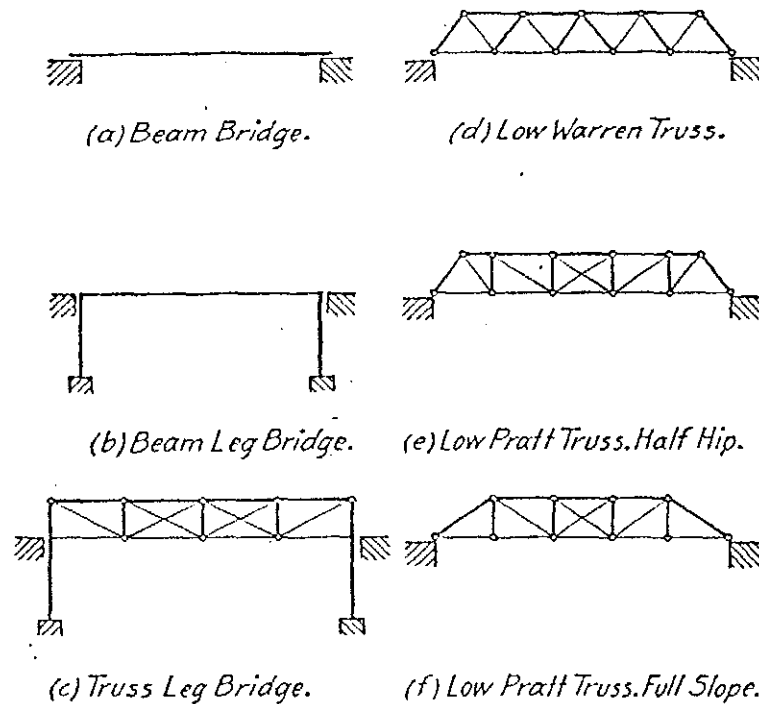


FIGURE 4. A 1912 illustration of simple-span bridges. Sketches (e) and (f) are common Pratt truss designs. Mitchell's Mill Bridge is similar to that shown in sketch (e). From Ketchum, Design, p. 5.

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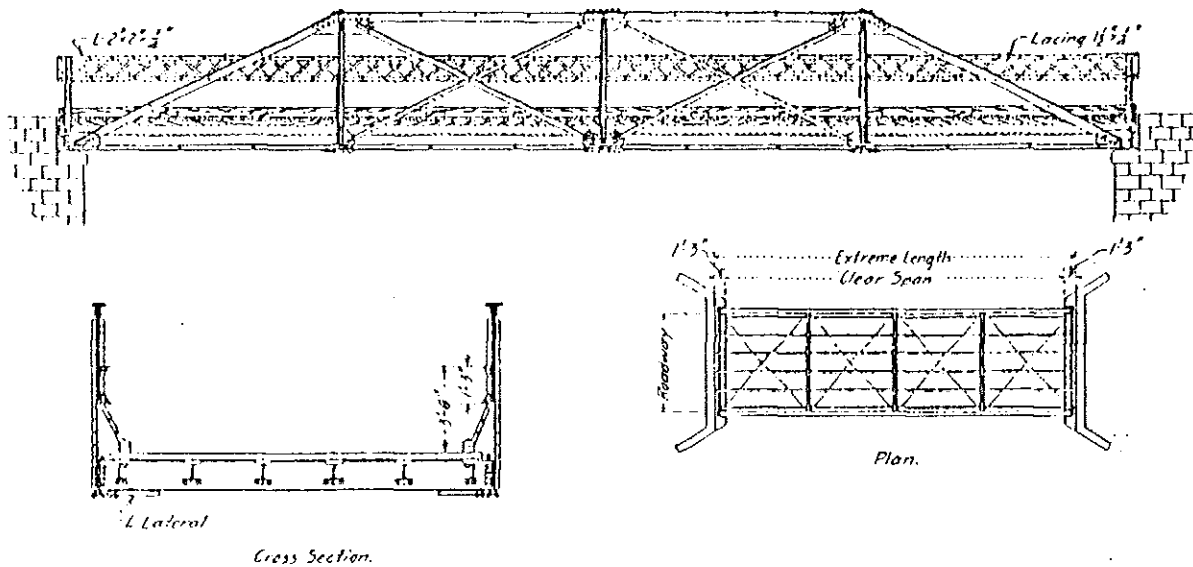


FIGURE 5. The American Bridge Company's 1912 design for a wrought iron, Pratt pony truss highway bridge similar to the Mitchell's Mill Bridge. From Ketchum, *Design*, p. 201.